Notes from the Edge

Insights into an Evolving Future

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DEMOGRAPHICS

New Simulations Predict the United States' Coming Climate Change Mass Migration. Most research on the effects of rising sea levels looks at immediate, direct outcomes—who is going to be underwater and when. But that's just the beginning of the story. The United States' largest population centers becoming uninhabitable will cause mass migration via several different mechanisms, and this effect has been much less studied. What happens to the rest of the country when its biggest, fastest-growing cities are no longer tenable? This is what University of Georgia geographer Mathew Hauer set out to explore in new simulations described in a paper published recently in *Nature Climate Change*. The results suggest bad things, generally, with large-scale population redistribution putting intense pressure on unprepared inland communities. Hauer assumes that people that make a lot of money are likely to remain in flooded areas because they have the means to adapt. And yet moving requires money as well, so there will likely remain a population of "trapped" residents, unable to migrate. At the same time, research has demonstrated that people tend to behave irrationally in crisis mode, which throws another wrench into the problem of predicting migration patterns.   **U.S. Eco-Migration**

Overpopulation is the Bane of Our Future (*ed.: This is an opinion piece; please treat it with due regard*) Many things currently plague the existence of Mankind. We face a mounting environmental crisis like no other in human history. We face many threats, including rapidly transmissible diseases, ideological and resource-based conflicts between nations, and the looming threats of energy deficits, economic collapse, resource shortages—and worst of all, potential extinction. The author opines that the human population has undoubtedly exceeded acceptable capacity, and is the reason why these issues are coming about. The ability for humanity to sustain a growing population—and a growing economy—is

becoming less and less possible. Our excessive growth threatens our relationship with the earth and ourselves. Ultimately, whether through the law or through our own will, we must band together to reduce our birth rate, or face the potential strife and population collapse—which may occur in the near future. **Overpopulation**

Rise of the Smart City. In just the past few years, mayors and other officials in cities across the country have begun to draw on the reams of data at their disposal—about income, burglaries, traffic, fires, illnesses, parking citations and more—to tackle many of the problems of urban life. Whether it's making it easier for residents to find parking places, or guiding health inspectors to high-risk restaurants or giving smoke alarms to the households that are most likely to suffer fatal fires, big-data technologies are beginning to transform the way cities work.   **Smart Cities**

TRANSPORTATION

Robot Cars and Fake Ethical Dilemmas. Something feels dishonest about the moral panic over self-driving cars. It usually involves bizarre crash scenarios that would (probably) never happen in real life. Does it matter that the scenarios are artificial or unrealistic? The details change, but the set-up is the same. We're supposed to imagine that a self-driving car is faced with some terrible decision: should it crash into a crowd of people, or swerve into a single person? Or into a little girl on the road, or swerve into the side of a mountain? Or into a school bus, or swerve off a cliff? And so on… (*ed.: An automotive industry executive recently commented to me that no matter how many people autonomous vehicles may injure or kill, it will always be fewer than human drivers injure or kill.*)   **Ethical Dilemmas**

In 15 Years, Millions of People Will Give Up Their Cars for Autonomous Ride Hailing. Autonomous cars are likely to be widely present on roads in three or four years. As adoption scales up, the cost of an Uber or Lyft (or whatever company replaces them) ride may drop roughly in half for consumers: not having to pay a driver will make the ride cost much less. The report, called *Driverless Future*, estimates how many car owners are likely to shift to hailing a driverless car because using an app is cheaper—and what that shift means for American cities.   **Giving up the Whip**

BIO-TECH

Super SEALs: Elite Units Pursue Brain-Stimulating Technologies. At a conference near Washington, D.C., in February, the commander of all Navy special operations units made an unusual request to industry: Develop and demonstrate technologies that offer "cognitive enhancement" capabilities to boost his elite forces' mental and physical performance.   **Brain Enhancements**

Hacking the Cell: Creating a Biocomputer. A team of researchers at Boston University has developed BLADE, or *Boolean Logic and Arithmetic through DNA Excision*, a development which has opened up new paths for manipulating and processing data stored in cells. Until now, genetic programming had only been carried out with yeast cells or bacteria. But the BLADE system offers the possibility of working on our own cells. Its programming process could help in the design of cells and tissues on-demand, and health monitoring genetic circuits. In diabetes, for example, a programmed cell could control the distribution of insulin. However, it is also possible for such technology to be weaponized, for example, be programmed to weaken immune system defenses against a particular biological agent.   **Biocomputers**

BLOCKCHAIN

Blockchain Is Helping to Build a New Kind of Energy Grid. A company called LO3 Energy has developed a blockchain-based system that lets people buy and sell locally-generated solar energy within their communities. Distributing energy this way is more efficient than transmitting energy over distances, said LO3's founder, Larry Orsini, and would make neighborhoods more resilient to power outages, as

well as helping meet demand when energy needs exceed expectations. It's also in line with growing public support for renewable energy, distributed and decentralized energy systems, and "buy local" programs in general. LO3 Energy launched its peer-to-peer energy transactions system, which it calls the Brooklyn Microgrid, about a year ago. The miniature utility grid connects people who have solar panels on their roofs in several parts of Brooklyn with neighbors who want to buy locally generated green energy. Like other microgrids it operates alongside, but separate from, the traditional energy grid. "Blockchain is a really good communications protocol for what we want to do," Orsini stated. "This isn't just about settling energy bills," he added. "It's about self-organizing at the grid edge, which can't be done with normal databases."   **Blockchain Energy Grid**

The Future of Digital Money. Unlike Bitcoin, the virtual currency it supports, blockchain has garnered wide support for its ability to reduce the cost and time of verifying transactions without the need for a central authority. New Fintech (financial technology) entrants are playing their part in helping drive payment digitization. Dubai-based bank Emirates NBD partnered recently with Open Bank Project on a Fintech hackathon to identify new financial start-ups. The Dubai Government has also taken up the potential of next-generation e-commerce. Similarly, the Dubai Smart Government initiative aims to record all government transactions on blockchain by 2020—an initiative that could amount to savings of more than $1.5b in document processing and more than 25 million hours in lost productivity. The Dubai Government is also trying to position itself and the emirate at the forefront of technology development, creating the infrastructure to allow Emiratis and expatriates to start new blockchain-based businesses. Blockchain also promises intermediary-free remittances across the UAE with an estimated 60% reduction in transaction costs for users. While these pockets of progress in the Middle East and North Africa—and the future global potential—are very encouraging, a coherent plan is still needed to harness the open source approach to the development of financial services, and reap the rewards offered by the digital and demographic dividend. The natural place to start is installing the flexible but robust regulatory infrastructure needed to leverage mobile money.   **Digital Money**

Background: Will Blockchain be the Ultimate Disrupter? Harvard Says Yes.
Blockchain Background

RESOURCE SCARCITY

Crystalline Material Could Replace Silicon to Double Efficiency of Solar Cells. A new material developed by researchers at Purdue University and the National Renewable Energy Laboratory has been shown to have the capability to double the efficiency of solar cells. Conventional solar cells are at most one-third efficient, a limit known to scientists as the Shockley-Queisser Limit. The new material, a crystalline structure that contains both inorganic materials (iodine and lead) and an organic material (methyl-ammonium), boosts the efficiency so that it can carry two-thirds of the energy from light without losing as much energy to heat. In less technical terms, this material could double the amount of electricity produced without a significant cost increase.   **Solar Upgrade**

Smarter Use of Natural Resources Can Inject $2 Trillion into Global Economy by 2050 – UN. The United Nations has found that smarter and more efficient use of the world's natural resources today can yield an "environmental win-win' by injecting $2 trillion into the global economy by 2050 while also offsetting the costs of ambitious climate change action. The global population, which is set to grow by 28 per cent, is predicted to use 71 per cent more resources per capita by 2050. Without urgent steps to increase efficiency, the global use of metals, biomass, minerals—such as sand—and other materials will increase from 85 to 186 billion tons per year by 2050. The report analyzed four paths that countries could take over the next three decades, ranging from "business as usual" to a scenario where they adopt both ambitious climate policies and improve resource efficiency. Although other key findings point to uneven economic gains of resource efficiency and slower resource extractions, which would reduce revenues and affect jobs in some industries, countries still stand to gain more by implementing

compensation and transfer policies to ease the transition to more efficient practices than by continuing to support inefficient activities. In addition to economic benefits, the analysis illustrates that resource efficiency and climate action would reduce global resource use by around 28 per cent in 2050 compared to current trends.   **Resource Economy**

ECONOMICS

The Global Forces Inspiring a New Narrative of Progress. Growth is shifting, disruption is accelerating, and societal tensions are rising. It's easy, however, to lose sight of long-term trends amid short-term gyrations, and there are moments when the nature and direction of those trends become less clear. Today, for example, technology is delivering astounding advances, and more people are healthy, reading, and entering the global middle class than at any period in human history. At the same time, the post-Cold War narrative of progress fueled by competitive markets, globalization, and innovation has lost some luster.   **Future Economy**

TECHNOLOGY/CYBER

What's After Smartphones? The author opines that the multiple breakthroughs in artificial intelligence (AI) technologies may eventually displace smartphones in the future. A survey done by Ericsson in December 2015 expects that smartphones will become a "thing of the past" in about five years, and that AI will be taking over many of the tasks that we are performing on our smartphones today. Ultimately, we might be looking at tiny devices that can be implanted in our brains and give us direct interaction with computers. As such, Tesla and SpaceX CEO Elon Musk are working to prevent, or at least postpone, the threat of AI surpassing human intelligence. Musk believes tech that will merge our minds with machines is about four or five years away.   **The Era of Smartphones is Ending**

Cybersecurity in 2025: The Skills We'll Need to Tackle Threats of the Future. With two-thirds of large UK firms targeted by cybercriminals in 2016, this article looks at the skills the next generation of professionals might need to protect us from artificial intelligence hackers, rogue self-driving cars and financial ruin.   **Cyber 2025**

Machine vs. Machine Battle Has Begun to De-fraud the Internet of Lies. Every time we look up, it seems as though we discover another form of dishonesty; grifting grown to global scale via the magnificent-yet-terrifying combination of Internet and smartphone. Security has been stretched to the breaking point. As soon as any system to detect lies goes into widespread deployment, the least honest and most clever will go to work undermining that algorithmic determination of truth, finding its weaknesses, and exploiting them. Thus, over the long term, the search for truth will always be an act of persistence and dedication. Any alignment of commerce with the greater good is a rare and potent combination, meaning the resources to fight this battle will be available into the foreseeable future. When it comes to truth, what's good for Google and Facebook is good for the rest of us.
Internet of Lies

FUTURES ASSESSMENT DIVISION

The *Science Fiction Futures* anthology, the *MCSEF*, and previous editions of *Notes from the Edge* can be found at the link:
Futures Assessment Division

"The man who has anticipated the coming of troubles takes away their power when they arrive." – Seneca

This newsletter is intended to highlight issues and ideas which may prove significant in the evolving future. In keeping with our focus on both alternative futures and analysis, items in this bulletin will generally be of an alternative nature, or drawn from atypical sources.